

NOTES, ABSTRACTS, AND REVIEWS

Severe dust storms over Idaho, Washington, and Oregon.—On March 19, 1930, an exceptionally severe dust storm occurred in the inland empire of eastern Washington, Oregon, and northern Idaho. The weather map of that date shows a strong HIGH over western Oregon and adjacent Pacific Ocean with a LOW in southern Alberta. This distribution of pressure is the ideal condition for a chinook, but, owing to drought and previous warm weather, there was no snow to melt on the lowlands and the moisture was quickly evaporated from the top soil, allowing dust to be picked up in great quantities. The velocity of the wind exceeded 30 miles an hour at times.

The writer collected samples of the dust that had fallen on a clean paper held flat by weights that lay on a table on a screened porch. The dust weighed 2.03 grams per square foot. Dust deposits in front and at the back of the house were nearly double the amount given, but were disregarded, since it seemed that they might be above average and a conservative result was desired. The deposit of 2.03 grams per square foot equals 62 tons per square mile. Assuming that the inland empire had 50,000 square miles affected by the storm and that the fall of dust at Cheney was an average of the whole region, some 3,000,000 tons of dust were deposited. Allowing 60 tons per freight car and 100 cars per mile, it would take a freight train 500 miles long to move the dust that the storm moved in about eight hours; or, since a cubic yard weighs about 1 ton, the dust would make a column 1 square yard in cross section and 1,700 miles high.—*O. W. Freeman, State Normal School, Cheney, Wash.*

Snows do not govern crops.—According to E. R. Henson, assistant professor of farm crops at Iowa State College, heavy snowfall does not necessarily mean a bumper crop the next year.

Experiments have proved that soils can only hold a certain amount of moisture and when that amount is attained any additional moisture moves on down through the soil, finally drain off underneath.

These experiments have shown that soil can hold only about $1\frac{1}{2}$ inches of water per foot of depth. As the roots of plants normally are largely in the surface 7 inches of soil and the entire system seldom penetrates beyond the 4-foot line, the water that the soil can hold at any time within the reach of plants is equivalent to only about 6 inches of rain.

In sections where rainfall is not abundant, heavy snow furnishes an ideal source of moisture and good crops may follow. In sections such as Iowa, however, where rainfall is usually abundant and the soil often already has its quota of moisture, the moisture from heavy snows will merely drain off. Where this happens, the soil is often depleted in fertility because of the possibility of the excess moisture carrying off large quantities of calcium and nitrogen together with lesser amounts of phosphorous and potassium. Heavy snowfall and excess moisture may, then, be a detriment in some seasons in Iowa, while in other years it is a great benefit.

Nine waterspouts near Equator.—Second Officer E. S. Bryant, of the British steamer *Oilshipper*, reports that between 1 and 2.30 p. m. (ship time) on February 23, 1930, in latitude $8^{\circ} 49' N.$, longitude $84^{\circ} 41' W.$ (off Pacific coast of western Panama), nine waterspouts were observed, the nearest being about one-half mile distant. The formation, which was common to all, appeared to commence at the surface of the sea under a low bank of nimbus cloud. A few minutes later a tapering cloud formation gradually dropped, increasing in length, at an angle toward the agitated area on the sea. This had the appearance of a whirlpool with an anticlockwise motion. The spray around the base of the spout was caught in the whirl and carried upwards for about 50

feet. Throughout the duration of the spout there was no visible connection between the whirl on the sea and the lower part of the column of cloud, which extended about two-thirds of the distance to the sea. The peculiar effect suggested that the tapering cloud formation was hollow and was characteristic of all the spouts. The weather at the time was calm with a smooth sea, although all the waterspouts were moving at a fair rate to the east-northeastward. The temperature of the air was $82^{\circ} F.$; of the sea, 86° ; barometer, 29.86 inches.—*Hydrographic Bulletin, Washington, D. C. March 19, 1930.*

Forecasting Mean Winter Temperatures for the North American Interior; by Chas. F. Brooks.—Application of the Groissmayr formula, based chiefly on summer weather in India, 1929, indicated a plus departure of $1.4^{\circ} F.$ in mean temperature for Winnipeg from December, 1929, to February, 1930, inclusive. (MONTHLY WEATHER REVIEW, November, 1929, p. 454.)

Through the courtesy of Director Patterson, of the Canadian Meteorological Service, we learn that the mean for these months at Winnipeg was $2.9^{\circ} F.$, or $1.6^{\circ} F.$ above a 20-year normal, and $2.2^{\circ} F.$ above the (1873–1920) normals in "World Weather Records" (Clayton). This successful forecast makes the sixth forecast based on Groissmayr's formula founded on earlier years of record. Of these six, two were nearly perfect, two reasonably successful, one good, and one poor. M. W. R. p. 455.)

The forecast formula can not be said to give any more than simply the mean temperature. This forecast of the past winter as one averaging slightly above normal would hardly have led one to expect the moderately cold December and January, 1.9° and $3.4^{\circ} F.$ below normal, and the extraordinarily warm February, $11.9^{\circ} F.$ above normal. Is a forecast simply of the mean temperature for the three months together of any value?

Air-Mail Pilot Encounters Severe Thunderstorm in Florida, by James W. Smith.—Air-Mail Pilot F. B. Cann encountered a thunderstorm of unusual intensity over east-central Florida the afternoon of March 23. Pilot Cann took off from Daytona Beach at 4:35 p. m. with the southbound air mail. The ceiling was low, 600 to 800 feet, and a light rain was falling at the time. Reports from southern Florida indicated fair weather, and no reports were available from other regularly reporting stations along the route, due to the fact that the plane was several hours behind schedule.

The rain increased from light to heavy and soon it was impossible to see the ground from above 300 feet. The air became very rough, with strong vertical currents, and, considering the poor visibility due to the heavy rain, Mr. Cann thought it safer to gain altitude and fly blind, which he did, at the 1,000-foot level. The rain was uniformly warm and no hail or lightning observed, although thunder crashed heavily on two occasions. Such severe storms are unusual at this season, and it seemed better to "stick it out" for a few minutes than to go back through the weather just experienced and land at Daytona Beach.

The storm lasted to just south of Titusville, requiring 30 minutes for a portion of the trip ordinarily covered in 22 minutes. Here the rain stopped and the dense clouds abruptly broke away, leaving the sun visible through a layer of high thin clouds. The storm passed quickly out over the ocean and rapidly whipped up a rough sea. On the fringe of the storm over Indian River Mr. Cann counted 15 whirlwinds which picked up water from the

wave crests, but none of which attained the proportions of a water spout. Seeing some fishing boats, he flew low enough to warn them of the approaching storm, then continued south to Miami.

A check-up on the plane after landing showed that paint had been removed from the more exposed portions as though by a sand-blast, and the forward edge of the steel propeller was nicked and eroded to such an extent that it was necessary to order a new one. Pilots and mechanics of the Miami airport agreed that they had never before seen a propeller so damaged by rain. The asbestos packing was washed from the gaskets and the cockpit was soaked, which is unusual even in a heavy rain, although the mail, which was in a closed double-bottomed cockpit, escaped injury.

Mr. Cann had at no time expected the storm to be so severe nor of such long duration, and states that in the event of meeting another he would immediately land the plane, if possible.

A low-pressure area, about 29.75 inches, was central over Florida at the time, and the 8:00 a. m. reports from near-by stations the following morning showed heavy rainfall: Jacksonville, 2.34 inches; Orlando, 3.48; Eustis, 1.34; Titusville, 1.68; and Sanford, 1.01.

Speed record airplane flight, Ralph Sanders.—On March 2, 1930, Pilot Frank J. Andre, flying the air mail, took off from Atlanta at 3:30 p. m., arriving at Macon at 3:55 p. m. The distance of 77 miles (airline) was covered in 25 minutes, averaging 185 miles per hour.

Line Superintendent A. P. Kerr left Macon at 1:20 p. m. and arrived at Jacksonville at 2:35 p. m., flying an airline distance of 210 miles in 75 minutes, an average of 168 miles per hour. (The pilot's report and field manager's time report disagreed by 10 minutes. On pilot's log, arrival time is 2:25 p. m. Departure from Macon agreed on both reports. If the pilot's time, 65 minutes, were used the average speed would approximate 200 miles per hour.)

On the flight from Macon to Jacksonville the pilot reported that below 6,000 feet the air was unusually bumpy, but at 7,000 feet, which altitude he held, it was quite smooth. The balloon runs made at Atlanta (12:10 p. m.) and Jacksonville (3:00 p. m.) yield the following information:

6,000 feet: Atlanta wind northwest, 56 miles per hour; Jacksonville wind west-northwest, 45 miles per hour.

7,000 feet: Atlanta wind northwest, 76 miles per hour; Jacksonville wind west-northwest, 56 miles per hour.

8,000 feet: Atlanta wind northwest, 94 miles per hour; Jacksonville wind west, 63 miles per hour.

Since the wind backed toward west as the plane from Macon approached Jacksonville, giving cross rather than tail winds, with an appreciable decrease in velocity, the reason for the greater speed of the plane from Atlanta to Macon over the one flying from Macon to Jacksonville is apparent.

These two flights are record flights for speed. Eastern Air Transport states that these planes have a maximum speed of 135 miles per hour, with a generally used cruising speed of 110 miles per hour.

On the same date as the other two flights Pilot Eugene R. Brown took off from Atlanta at 9:05 a. m. for Greensboro, arriving at 11:05 a. m. The airline distance of 307 miles was made in two hours, an average speed of 153 miles per hour.

The 6:10 a. m. balloon run at Atlanta shows a surface wind of 25 miles per hour from west-northwest, steadily

and rapidly increasing to 78 miles per hour from north-west at 7,500 feet, decreasing to 67 miles per hour from the west at 8,200 feet, then increasing again to 90 miles per hour from the west at 10,800 feet. This gave the pilot strong cross winds, which hindered rather than helped, but he was helped by the wind shifting toward the southwest as the plane approached Greensboro, as shown by the following data taken from the 6:04 a. m. balloon run at that place: Surface west-northwest, 10 miles per hour; 6,000 feet west, 51 miles per hour; 7,500 feet west-southwest, 54 miles per hour; and 8,000 feet west-southwest, 56 miles per hour.

The above information, with the exception of the wind data, was furnished by Mr. E. V. W. Jones, editor of *New Wing*, published by Eastern Air Transport, owner of the planes.

Pilot Wheaton's Experience Against Terrific Head Winds, by L. A. Warren, Cheyenne Airport.—Pilot H. A. Wheaton, flying the morning westbound mail out of Cheyenne on March 22, 1930, relates the following experience against terrific head winds.

Leaving Cheyenne about 5 a. m. he attempted to fly the usual course over Sherman Hill, a point about 30 miles west and approximately 3,000 feet higher than Cheyenne. His air speed was calculated at from 90 to 100 miles per hour, but the head winds he encountered were of such force as to cause the plane to actually drift backward. Seeing that he was making no progress against the wind he turned back and flew over the mountain range several miles south and at a lower height. The winds there were of high velocity, not too strong, to prevent a very slow progress.

High winds from a westerly direction are frequently encountered over the Sherman Hill Pass, but not often of such velocity as to prevent at least a slow movement against them.

Changes in the Daily Weather Report of the London Meteorological Office. [Condensed from the *Meteorological Magazine, Meteorological Office, Air Ministry, London, March, 1930.*]—Due to rather drastic revision in the international exchange of meteorological information brought about at the Conference of Directors of Meteorological Services at Copenhagen in September, 1929, the London Meteorological Office deemed it advisable to change the form of the Daily Weather Report issued by that office so as to include, beginning March 1, 1930, a weather chart for the Northern Hemisphere for the morning of the date of issue. The dimensions of this new chart are substantially 12 by 12 inches, a small reduction in size from the one previously issued. The pressure distribution is shown by isobars drawn for an interval of 4 millibars (0.12 inch); temperature, in degrees Fahrenheit, is printed on the chart, as are also wind direction and force and the state of the sky by appropriate symbols.

The only serious hiatus on the chart is the absence at times of reports from about a quarter of the Northern Hemisphere, say, from 100° to 180° east longitude. It may be, however, that means of communication with Siberian stations along and north of the fiftieth parallel of north latitude are not yet as fully developed as may be possible.—A. J. H.

Climatic cycles in the Eocene.—A geological paper of more than usual interest to climatologists is "Varves and Climate of the Green River Epoch; by Wilmot H. Bradley.¹ This is a study of marlstone, oil shale, and fine-grained sandstone from lake beds of middle Eocene

¹ U. S. Geological Survey, Professional Paper 158-E, Washington, 1929.

age (first of the five subdivisions of the Tertiary) in Colorado, Utah, and Wyoming.

These rocks consist of varves, not glacial but biochemical in origin. Each varve consist of two laminæ, one of ooze that has lithified into oil shale, the other of calcium and magnesium carbonate such as is now being deposited as marl in many lakes. From analogy with modern lake deposits it is argued that the carbonates were precipitated in early summer, the oil shale later in the hottest season, and that these sediments were still more sharply separated by differential settling. Study of the sandstone layers suggests that the climate was marked by a well-defined winter rainy season, and examination of plant remains indicates temperatures and rainfalls similar in amount to those now prevalent in Louisiana.

In addition to the bilaminal annual cycle, recurrent groups of thick varves show an average interval of a little less than 12 years, with individual intervals ranging from 7 to about 18 years.

An average cycle of 21,630 years resulted from measurements on four groups of alternating beds of oil shale and marlstone, affording 16 cycles. Croll's hypothesis, it will be remembered, was based on a cycle of about 21,000 years, the resultant of the cycle of the precession of the equinoxes in 25,000 or 26,000 years, and the revolution of the line of apsides, in the opposite direction.

A third cycle, of about 50 years, is represented by regularly recurrent layers of calcite-filled cavities that are supposed to have originally been filled with a salt-like glauberite. This corresponds to no well-established rhythm.

Climatologists will envy Bradley his wealth of material. From measurements of varves he estimates the Green River epoch to have lasted between five and eight million years.—*Eric R. Miller.*

Padua, Italy, precipitation, 1900-1928.—A correspondent asks us to print the continuation of the Padua record of annual precipitation that was given in the article by Robert E. Horton on "Group distribution and periodicity of annual rainfall amounts, this REVIEW, 51: 514-521. This we do in the following table:

Total annual precipitation (millimeters) ¹

1901.....	1,029.7	1915.....	943.3
1902.....	851.1	1916.....	1,131.9
1903.....	800.3	1917.....	742.1
1904.....	794.2	1918.....	971.1
1905.....	1,140.5	1919.....	875.5
1906.....	818.5	1920.....	910.1
1907.....	714.4	1921.....	429.6
1908.....	566.0	1922.....	691.7
1909.....	715.1	1923.....	752.6
1910.....	1,075.4	1924.....	878.4
1911.....	906.6	1925.....	728.1
1912.....	762.1	1926.....	741.2
1913.....	860.4	1927.....	798.1
1914.....	773.1	1928.....	835.6

Meteorological summary for Chile, February, 1930 (by J. Bustos Navarrete, Observatorio del Salto, Santiago, Chile).—The weak atmospheric circulation over the Pacific and the scantiness of rain noted in January

continued during this month. In the first decade depressions of minor importance crossed the extreme southern region and were accompanied by scattered rains between Magallanes and Valdivia, with maximum amounts on the 3d and 4th. Thereafter the weather was settled in high degree over the entire country. Two anticyclones of major importance were charted as follows: 17th-18th, moving from Chiloe toward Argentina, and 25th-28th, moving from Magallanes northward.—*Translated by W. W. R.*

BIBLIOGRAPHY

C. FITZHUGH TALMAN, in Charge of Library

RECENT ADDITIONS

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

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- American national red cross.
Mississippi Valley flood disaster of 1927. Washington. [1929.] vii, 152 p. figs. plates. 23 cm.
- Berlin. Flugwetterdienst.
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- Byers, Horace R.
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- Daniel Guggenheim fund for the promotion of aeronautics, inc.
Solving the problem of fog flying. A record of the activities of the fund's full flight laboratory to date. New York City. n. d. 152 p. 22 cm.
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- Tsiang, P. J.
La température de Tsingtao. 1929. iii, 69 p. plates (fold.) 25 cm.

¹ Record by months in Sitzungsberichte der kaiserlichen Akademie der Wissenschaften. 111. Abt. IIa. 1902.